

possessed of three sharp, slender, backwardly-curved denticles, with a base forming a broadly expanded plate divided at its posterior extremity into a pair of prongs, which doubtless extended, as in the existing species, beneath the succeeding tooth, thereby gaining additional firmness and strength. The figures indicate a tooth twice the diameter of the anterior teeth of the existing species. The author knew of no living or fossil representative of the teeth, and gave the figure with a short notice, without description or appending to it any distinctive name. There can be no hesitation therefore in associating the fossil with the existing genus, and it may not be inappropriate to append the name of Mr. Lawley and distinguish it specifically, *Chlamydoselachus lawleyi*.

The figures will be found in 'Nuovi Studi sopra ai Pesci ed altri Vertebrati fossili delle colline Toscane,' di Roberto Lawley, published at Florence in 1876, pl. i. figs. 1-1c. I am indebted to Mr. G. A. Boulenger for the opportunity of comparing them with the teeth of the recent *Chlamydoselachus* in the British Museum.

6. Contributions to the Anatomy of Earthworms.—No. IV.<sup>1</sup>  
By FRANK E. BEDDARD, M.A., F.R.S.E., Prosector to  
the Society, and Lecturer on Biology at Guy's Hospital.

[Received June 23, 1887.]

IV. *Description of* CRYPTODRILUS FLETCHERI, n. sp.

Of this species, which is a native of Queensland<sup>2</sup>, I have studied two specimens; one of these was fully mature with a well-developed clitellum, the other specimen was immature without any traces of a clitellum.

In the larger individual the clitellum occupied five segments, commencing with the thirteenth and ending with the seventeenth; the glandular epithelium of the clitellum extends all round the body on these segments with the exception of a ventral area on the seventeenth, corresponding to the part occupied by the ventral setæ and the space lying between them; this space was occupied by an elongated genital papilla, which is rather wider at the two extremities than in the middle. The four succeeding segments are furnished each with a similar papilla of equal size to that on the seventeenth segment and of identical appearance.

These structures closely correspond to the "dumbbell-shaped areas" described by Mr. Fletcher in another species of the same genus, *C. rusticus*; and the evident similarity lead me at first to believe that the species described here was identical with *C. rusticus*. I shall, however, have occasion in the sequel to refer to differences between the two species; and a careful comparison of Fletcher's description of *C. rusticus* with my specimen shows that in the

<sup>1</sup> *Ante* p. 372.

<sup>2</sup> I obtained the specimens through the kindness of Mr. S. Prout Newcombe.

arrangement of these papillæ there is really some little difference between the two species. In the first place, *C. rusticus* has only four of these dumbbell-shaped papillæ, while there are five in my specimen; this is a difference which might easily be explained away on the assumption that Fletcher's specimens were immature, except for the fact that he has examined a large number. Secondly, the papillæ in *C. fletcheri* are restricted each to one segment, the whole of the ventral area of which they occupy; in *C. rusticus*, on the other hand, the papillæ appear to be intersegmental in position.

The *male generative pores* are upon the eighteenth segment and are placed within the area of the ventral papillæ close to the pair of setæ.

The *female generative pore* is situated upon the fourteenth segment; it is a single slit-like orifice with tumid lips.

The apertures of the spermatheca as well as those of the nephridia were invisible in my specimen.

The *setæ* appear to have the same arrangement as in *C. rusticus*, viz. a pair of setæ on either side of the ventral line moderately close together and a laterally placed pair, the individual setæ of which are wide apart<sup>1</sup>.

The following notes upon the internal anatomy of the species are of course no more than is necessary for its adequate definition. I hope to be able at some future time to work out more elaborately certain points in the structure of this and other Lumbricidæ.

#### *Alimentary Canal.*

The chief feature in the anatomy of the alimentary canal to which I may call attention is the presence of calciferous glands; as these glands appear occasionally to be absent in Earthworms, it is important to record their presence in this species. I noticed two pairs of calciferous glands situated in segments 11 and 12; there may have been others, but an accident prevented an examination of the posterior segments. The position of the glands is somewhat unusual; instead of lying to the side of the intestine as is generally the case (e. g. *Acanthodrilus*, P. Z. S. 1885, pl. lii. fig. 1), they are placed below the intestine, and each gland comes into close relations with its fellow, separated from it, however, by the subintestinal vessel, which is supported by a mesentery.

The gizzard occupies segments 6 and 7.

#### *Nephridia.*

Another structural feature of this Earthworm renders it quite impossible to confuse it with *Cryptodrilus rusticus*, or, for the matter of that, with any other of the Australian species of Lumbricidæ.

Mr. Fletcher speaks of the nephridia as consisting of dendriform masses or tufts of glandular cæcal tubes, more developed in the

<sup>1</sup> Since this portion of my paper was written Mr. Fletcher has described (Proc. Linn. Soc. N. S. W., Sept. 1886) a second species of *Cryptodrilus* (*C. saccharinus*), which cannot be confounded with the species described above. It agrees with *C. rusticus* in the characters of the nephridia.

anterior segments of the body. In both species of *Notoscolex* the nephridia appear to be much the same, as also in *Didymogaster*: in these genera the description of the nephridia agrees fairly closely with what appears to be the characteristic features of these organs in *Perichæta*, at least in those species in which they have been observed. In my species of *Cryptodrilus* the nephridia are entirely different, and conform to the type that is met with in many species of Earthworms, including *Microchæta* and certain species of *Acanthodrilus*<sup>1</sup>. These organs in *Cryptodrilus fletcheri* consist of a complicated coil of glandular tubules, the details of which I have not worked out, but which appears to bear every resemblance to the corresponding part of the nephridium of *Lumbricus*, opening on to the exterior by a sac-like muscular duct, which is furnished at its extremity with a short diverticulum of identical structure.

Another fact of importance about the nephridia of this species is that their orifices are not fixed; like those of *Acanthodrilus novæ zelandiæ* and *A. dissimilis* and of *Plutellus*, the nephridia of *Cryptodrilus fletcheri* alternate in position from segment to segment. The position of the orifices, however, always corresponds to one of the setæ and may be placed in front of either of the dorsal pair, which have been already stated to be widely separated in this worm. Sometimes the position of the nephridial pore corresponds to the outermost of the two ventral setæ, but I have never observed the nephridial pore to be situated in relation to the ventralmost seta. In one specimen which I studied by means of transverse sections the nephridia appeared to commence in the second segment. In this and the two following segments the nephridiopores were placed in front of the dorsal seta; in the next three segments the nephridiopores have a similar relation to the ventral setæ of the lateral pair; in the ninth segment the pores were asymmetrically disposed, being on one side of the body in front of the outermost seta, on the opposite side in front of ventral seta of dorsal pair. In some of the succeeding segments the asymmetrical disposition of the nephridiopores was also found; in this particular character *Cryptodrilus* agrees with the other species referred to.

The difference in the nephridia of this species and of *C. rusticus* is not, in the present state of our knowledge, sufficient reason for separating the two forms generically; precisely similar differences are to be seen in *Acanthodrilus*.

#### *Reproductive Organs.*

The *seminal vesicles* (testes) in the specimen that I dissected have the very anomalous arrangement recorded by Fletcher; that is to say, a pair is placed in segments 9 and 12, the intermediate segments not being occupied by these structures.

The *ciliated rosettes* lie in segments 10 and 11.

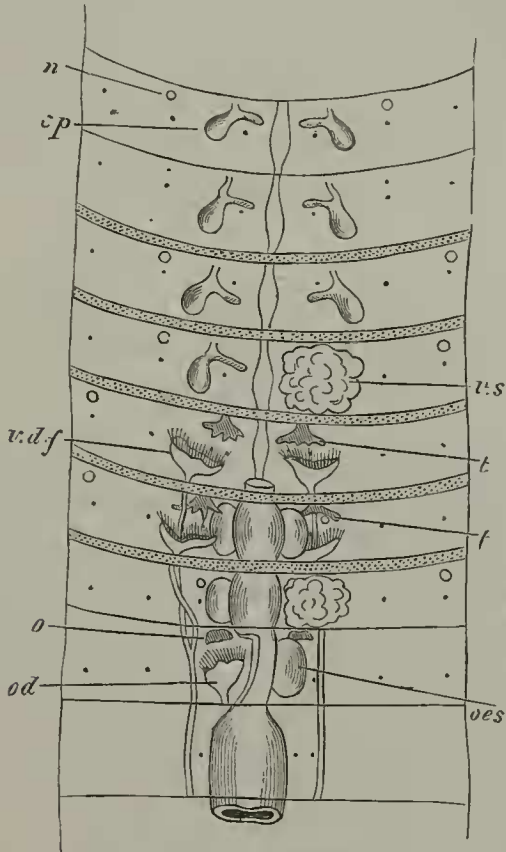
The same segments contain the testes, which are precisely similar in position and in structure to those of other Lumbricidæ. Au

<sup>1</sup> P. Z. S. 1885, p. 810.

examination of the genital region by transverse sections failed to show any trace whatever of the supposed missing vesiculæ of segments 10 and 11; those of segments 9 and 12 were well developed and exhibit a racemose structure, as is the case in some other Lumbricidæ.

There are large prostates as in *C. rusticus*.

*Spermathecæ*.—There are four pairs of these organs situated in segments 6, 7, 8, and 9; they are somewhat pyriform in shape, with a rapidly narrowing external duct; each is furnished with a single diverticulum which lies to the inside; the spermathecæ open on to the



*Crytodrilus fletcheri*.

*n*, nephridial pores; *v.d.f.*, vas deferens funnel; *v.s.*, vesiculæ seminales; *cp*, spermathecæ; *t*, testes; *o*, ovary; *od*, oviduct; *oes*, œsophageal glands.

The œsophagus has been removed for the greater part; in the 13th segment it has been removed from one side together with the œsophageal gland of that side, to display oviduct.

exterior in front of the outermost seta of the ventral pair. In the number and structure of the spermathecæ the present species differs from *C. rusticus*, where there are two pairs of spermathecæ each with two or three short diverticula.

Another curious fact about the present species is the difference of minute structure between the spermatheca and its diverticulum. The spermatheca itself is lined by a tall columnar epithelium; the

diverticulum, which joins the duct of the spermatheca just as it perforates the longitudinal muscular layer on its way to the exterior, has delicate muscular walls consisting of circular oblique and longitudinal muscle-fibres well supplied with blood-capillaries; the interior is lined with a delicate epithelium, the cells of which are so excessively thin that hardly anything of them is recognizable but the nuclei; this epithelium contrasts very conspicuously with the tall columnar cells which line the cavity of the spermatheca. The diverticula agree in their minute structure with the spermathecæ of *Urochæta*; it does not appear likely that they are immature considering their large size and the fully mature condition of the Worm.

The ovaries and oviducts occupy the usual position; the oviducts appear to open separately at either extremity of the slit-like female orifice; I am not, however, absolutely certain about this.

It is interesting to note the great difference in the spermathecal diverticula of this species and of *Acanthodrilus* (see Proc. Zool. Soc. 1885, p. 829) as regards their histological structure.

## 7. On *Bipalium kewense* at the Cape.

By ROLAND TRIMEN, F.R.S. &c.

[Received June 7, 1887.]

The characteristic figures of this Planarian given by Prof. Jeffrey Bell (Proc. Zool. Soc. 1886, pl. xviii.), together with Prof. Moseley's diagnosis of the species (Ann. & Mag. Nat. Hist. 5th ser. 1878, i. p. 237), have enabled me to identify it with a worm of which a good many specimens were brought to me in the years 1883-1885. Most of the examples were found by Mr. U. Chalwin, of the Botanic Gardens, Cape Town, from whom, on the 20th of January, 1883, I received the first and largest individual I have seen. I sent five specimens to Prof. Moseley in May 1883, along with some *Peripatus* specimens forwarded to Mr. A. Sedgwick; but it was not till the end of 1885 that I learned from Prof. Moseley the generic position of the worm. Five living specimens have recently been sent to me by Mr. Chalwin, and the comparison of them with the figures and diagnosis referred to leaves no doubt of their being *B. kewense*.

Unfortunately the circumstances of its occurrence here throw no light on the proper habitat of the species, as all the examples (20) brought to me, and others of which I have been informed, were found in gardens. No instance of the discovery of the worm in a wild uncultivated station is known to me. Mr. Chalwin found most of his specimens under flower-pots or plant-cases standing on damp garden-mould, sometimes in ordinary glass frames, but others occurred among damp grass.

I have not found this *Bipalium* exhibit here the extreme sensitiveness to light mentioned by Prof. Bell (*l. c.* p. 168). It is certainly more active at night, but several of my specimens have lived with apparent unconcern in glass jars (provided with water, earth, and